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Case Study

Synovial Osteochondromatosis

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ABSTRACT

We report three patients with synovial osteochondromatosis to highlight that simple removal of loose bodies and limited synovectomy gives symptomatic relief and has low risk of recurrence in the short term.

Keywords: Synovial osteochondromatosis, partial synovectomy

INTRODUCTION

Synovial osteochondromatosis (SOC) is a rare benign condition characterised by synovial metaplasia associated with formation of multiple osteocartilaginous loose bodies in a joint.[1-3] Its etiology is unknown.[2,4] The condition affects single large joints such as the hip, knee or the elbow. Patients present with insidious onset of pain, swelling and limited range of motion of the involved joint.[1] Diagnosis is suspected when the radiographs of the joint show presence of multiple radio-opaque loose bodies.[5]

Management of this condition is controversial. Some authors recommend removal of the loose bodies only.[2] Others advise simultaneous synovectomy to prevent recurrence.[1,3,4,6] Some dispute the feasibility of total synovectomy, suggesting it is technically impractical.[2] There is controversy also regarding the method of removal of loose bodies by arthroscopy [7] or by arthrotomy.[8] The condition is seldom seen in adolescence [6] and involvement of the ankle is rare. The management of three patients is reported here: a 16-year-old schoolboy with involvement of the ankle and two other adults with involvement of the knee. Each patient had different types of loose bodies.

CASE REPORTS

Case 1

A 16-year-old schoolboy was seen for pain and swelling of the left ankle of 6 months duration. He had stopped playing football for the last six months due to pain in the left ankle but could not recall any definite injury. He walked without limping but said it was painful to run. There was swelling over the front of the left ankle. Palpation revealed tender hard nodular masses over the anterior and the dorso-lateral aspect of the ankle. The anterior mass was mobile. The range of motion at the left ankle was limited to 0^0 to 10^0 of plantar flexion and no dorsiflexion was possible. Neurovascular examination of the lower limbs was

normal. Blood investigations were within normal limits. Plain radiographs showed several loose bodies on the medial, anterior and the antero-lateral aspect of the left ankle (*Fig.1*). No other joints were involved. Provisional diagnosis of SOC was made and the patient was advised to undergo removal of the loose bodies and limited synovectomy.

The left ankle was approached anteriorly through a transverse incision. Four small, round, smooth loose bodies about five millimeters in diameter and one large irregular 2.5 cm-long and 1.5 cm- wide loose body, which was half white and half greyish blue in colour (*Fig. 2*), were removed from the ankle. The loose bodies were lying free and not attached to the synovium. The histology of the synovium and the larger loose body confirmed SOC (*Figs. 3* and *4*). His postoperative recovery was uneventful. The wound healed primarily. When last seen, five months after the operation, he could walk and jog without pain and the range of motion *of* the left ankle had improved from 10^0 of dorsiflexion to 30^0 of plantarflexion. He was back at school doing light training.

Figure 1. Case 1: AP and lateral radiographs of the left ankle showing multiple radio-opaque loose bodies around the medial malleolus and the front of the ankle.

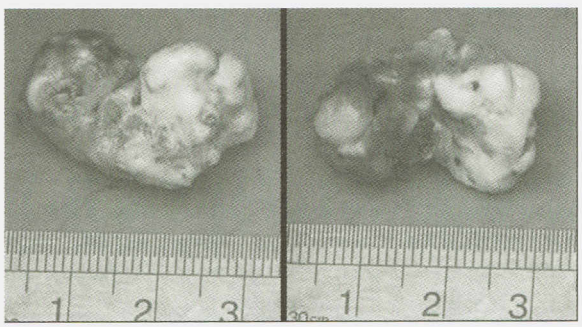

Figure 2. Case 1: Photographs of the large, double coloured, irregular loose body, both front and back views. The loose body was found lying free in front of the ankle.

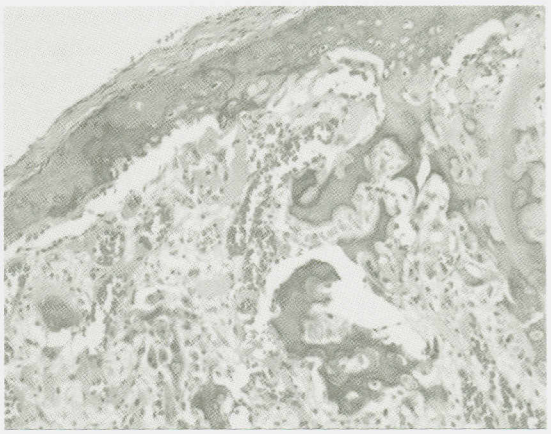

Figure 3. Case 1: Photo-micrograph of the H&E stained histological section from the white portion of the loose body seen in *Fig.2*. It shows some cartilaginous areas which are stained and a large number of blood vessels.

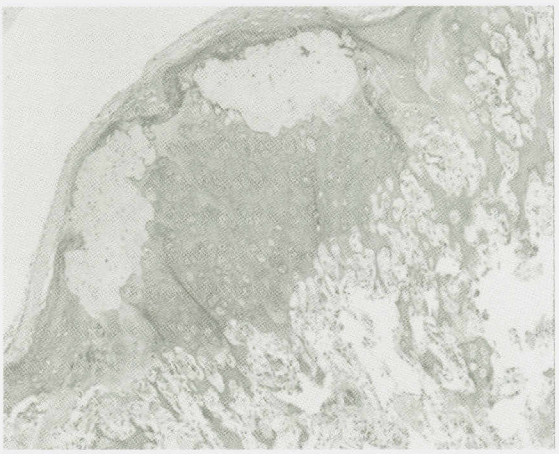

Figure 4. Case 1: Photo-micrograph of H&E stained histological section from the bluish-grey portion of the loose body seen in *Fig.2*. It shows, in contrast to the white portion *Fig.3*, more cartilaginous areas and fewer blood vessels.

Case 2

A 27-year-old married woman, an office clerk, was seen for gradually worsening pain and swelling of the right knee of three years duration. She denied any history of trauma and was otherwise in good health. She walked with a right-sided limp. There was diffuse swelling in the suprapatellar region of the right knee that had a doughy feel. The range of motion at the knee was painfully limited from 0 to 110^0 of flexion. Plain radiographs of the knee showed

multiple loose bodies within the joint. The laboratory investigations indicated that serum calcium, phosphorus and alkaline phosphatase were within normal limits. The ESR was high; 86 mm/hr. No other joints were involved. A provisional diagnosis of SOC was made and the patient was advised arthrotomy of the knee for removal of loose bodies and synovectomy.

At operation, when the joint capsule was incised several hundred small rice grain type loose bodies, 2 to 4 mm in diameter gushed out (*Fig. 5*). The synovium looked inflamed and was studded with whitish bodies. The visibly inflamed synovium was excised. The joint was washed with saline to remove all the loose bodies. Some large irregular loose bodies were also flushed out. The articular surfaces of the joint were well preserved and appeared normal (*Fig.6*). Histological examination of the synovium confirmed the diagnosis of SOC. Her post-operative recovery was uneventful. Two months later, the movements at the knee had improved to 0^0 to 130^0 of flexion. She returned to her job four months after the operation. When last seen, two years after the operation, she was symptom-free and the radiographs of the knee did not show any recurrence.

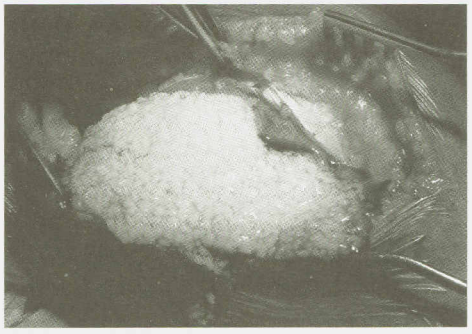

Figure 5. Case 2: Hundreds of rice grain-like loose bodies oozed out of the capsule of the knee joint.

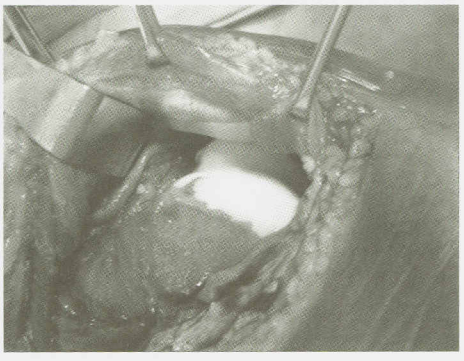

Figure 6. Case 2: Intra-operative photograph of the knee joint showing red inflamed hypertrophied synovium in the supra-patellar region and over the lateral femoral condyle. The synovium was studded with whitish speckles – start of the formation of loose bodies. The articular surfaces of the femoral condyles and the patella had not been damaged by the disease process.

Case 3

A man aged 50 years was seen because of increasing pain and swelling of the right knee of five years duration. He had no other complaint and was otherwise in good health. Examination of the right knee revealed swelling of the suprapatellar region with palpable mobile bony hard masses. The range of motion at the knee was from 0^0 to 110^0 of flexion. There was no ligamentous laxity of the knee. Blood investigations were within normal limits. Plain radiographs of the knee showed multiple round radio-opaque loose bodies in the joint (*Fig. 7*). Provisional diagnosis of synovial chondromatosis was made. Athrotomy of the knee revealed several smooth, round, pearly white, 1 cm in diameter loose bodies in the suprapatellar region (*Fig. 8*). Histology of the synovial membrane confirmed the diagnosis of SOC. His post-operative recovery was uneventful. He was relieved of the pain and the range of movements in the knee also improved. There was no recurrence after four years.

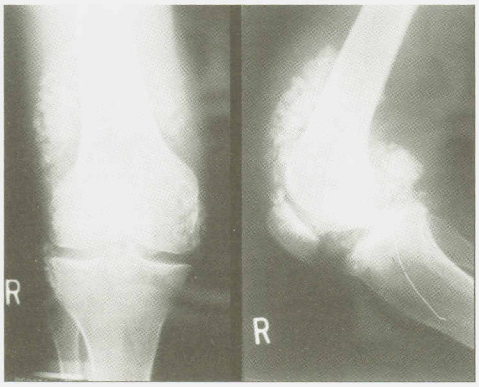

Figure 7. Case 3: AP and lateral radiographs of the knee showing presence of multiple radio-opaque loose bodies in the joint. There are erosions of the lateral tibial condyle as well as the medial femoral condyle. This is a typical radiographic appearance of synovial osteochondromatosis.

Figure 8. Case 3: Intraoperative photograph of the knee showing several round white pearl-like loose bodies found in the suprapatellar region. Some loose bodies were attached to the synovium, others were lying free.

DISCUSSION

SOC is a self-limiting disorder characterised by formation of intra-articular loose bodies in an otherwise healthy individual. Multiple loose bodies are seen in 80% of the cases of SOC.[1] On the radiographs, they appear as juxta-articular radio-dense shadows or as discrete stippling characteristic of a cartilaginous lesion. Diagnosis can be made in the presence of four or more loose bodies within the joint even in the absence of metaplasia on histology.[1,4,5] The routine use of arthroscopy and of MRI scan has not resulted in increased diagnosis of SOC; that would suggest that it is genuinely a rare condition.

Several types of loose bodies have been recognised in SOC. Each patient, in this series, presented with a different type of loose body. In the ankle of the 16-year-old schoolboy, a double coloured white and bluish-grey, irregular loose body was found. The white portion of the loose body suggested osseous origin whereas the bluish portion cartilaginous origin. The histological features of both the parts are seen in *Figs. 3* and *4*. In Case 2 there were hundreds of small rice grain loose bodies and in Case 3 smooth pearly white loose bodies between 0.5 to 1 cm in size were seen. The significance of different types of loose bodies could not be ascertained, as their histological features were nearly similar.

Metaplasia can occur in the synovial membrane of the joints as well as the bursae or the tendon sheaths.[9] However, extra articular SOC is rare.[1, 9] Commonly, a single large joint is involved. Jaffe emphasises that the diagnosis should be made only when there is cartilage metaplasia in the subsynovial tissue.[4] Milgram [5] suggests that the cartilage metaplasia merely indicates active intrasynovial disease. He classified SOC into three phases. Phase I – active phase, with intrasynovial disease but no loose bodies; Phase II – transitional phase, with active intrasynovial disease and loose bodies and Phase III – late phase, with multiple loose bodies but no intrasynovial disease. The implication being that synovectomy is unnecessary in the absence of synovial disease in Phase III and possibly in Phase II.[5] Perhaps, this explains why patients have relief after removal of loose bodies only.

It is widely accepted that SOC resolves spontaneously or after simple removal of loose bodies or after incomplete synovectomy.[4] Murphy[10] describes 32 patients who had open removal of loose bodies and the affected synovium, in which there was only one recurrence. Jeffreys[2] reviewed 17 patients treated by surgical removal of the loose bodies only and reported no recurrence. Removal of loose bodies alone is preferable to total synovectomy because there is less post-op stiffness. Coolican *et al.*[7] report that arthroscopic removal of loose bodies and the affected synovium achieve better results than open procedure. Ogilvie-Harris *et al.*[8] dispute this, and report that patients achieved significant improvement in pain and function after either open or arthroscopic removal. All three patients in this study had arthrotomy to remove the loose bodies and excision of the easily accessible inflammed synovium only. Total synovectomy was not attempted

Generally, recurrences respond well to repeat procedures. [3] However, it is difficult to know whether the recurrence is genuine or due to incomplete removal of synovium.[4,5] All the three patients, in this series, did not have recurrence. However, their follow up was short; ranging from five months to four years. There is a report of a rare refractory case of SOC in a 24-year-old sportswoman who had seven unsuccessful synovectomies prior to requiring arthrodesis of the knee as a salvage procedure.[3] Although rare, progression to chondrosarcoma has been reported.[6]

CONCLUSION

Three cases of synovial chondromatosis were treated by removal of loose bodies and excision of easily accessible inflammed synovium. Their symptoms were relieved. There was no recurrence at follow-up which ranged between five months to four years. We concur with other authors that removal of loose bodies and partial synovectomy gives satisfactory results.

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